

A. In the claims:

Please amend the claims as follows:

1. (Withdrawn-currently amended) A process ~~for~~ of making an electrical device, the process including ~~the steps of~~:

producing a dielectric material ~~having~~ comprised of a top surface with cavities remaining from removing a portion of the dielectric material; and

building up a conductive layer on the dielectric material to fill the cavities ~~so as to~~ form teeth set in and under the top surface of the dielectric material and form a portion of circuitry of the electrical device, wherein a plurality of the cavities are obtuse with respect to the top surface, and a plurality of the cavities are at least 1 tenth of a mil deep.

2. (Withdrawn) The process of claim 1, wherein the removing of the portion is sufficient to produce a surface gloss measurement at an angle of 60 degrees of less than 10%.

3. (Withdrawn-currently amended) The method of claim 2, wherein the ~~step of~~ applying a dielectrical material and the step of forming a metal layer are carried out building up is sufficient to produce a peel strength greater than the peel strength than that of a single desmear process.

4. (Withdrawn-currently amended) The process of claim 1, wherein the ~~step of~~ removing does not include physical roughening, and the building up the conductive layer includes building up the conductive layer to produce a dielectric surface contact area greater than a dielectric surface contact area that would be produced by a single pass roughening.

5. (Withdrawn-currently amended) The process of claim 1, wherein the ~~step of removing does not include physical roughening, and the~~ building up the conductive layer includes building up the conductive layer to produce a peel strength greater than a peel strength that would be produced by a single desmear process.

6. (Withdrawn-currently amended) The process of claim 1, wherein the ~~step of removing does not include physical roughening, and the~~ building up the conductive layer includes filling the cavities ~~building up the conductive layer~~ sufficiently that separation requires destroying integrity of at least one of the conductive layer and the dielectric material.

7. (Withdrawn-currently amended) A process of making an electrical device, the process including ~~the steps of:~~

producing a dielectric material ~~having~~ including cavities remaining from removing a portion of the dielectric material; and

building up a conductive layer on the dielectric material to fill the cavities to form a surface of substantially angular teeth set in the dielectric material and form a portion of circuitry of the electrical device, and wherein a sample of the circuitry has at least 20% of the teeth being at least 1 tenth of a mil deep.

8. (Withdrawn) The process of claim 7, wherein the removing of the portion is sufficient to produce a surface gloss measurement at an angle of 60 degrees or less than 10%.

9. (Withdrawn-currently amended) The process of claim 7, wherein the ~~step of~~

removing does not include physical roughening, and the building up the conductive layer
includes building up the conductive layer to produce a dielectric surface contact area greater
than a dielectric surface contact area that would be produced by a single pass roughening.

10. (Withdrawn-currently amended) The process of claim 7, wherein the ~~step of~~
removing does not include physical roughening, and the building up the conductive layer
includes building up the conductive layer to produce a peel strength greater than a peel
strength that would be produced by a single desmear process.

11. (Withdrawn-currently amended) The process of claim 7, wherein the ~~step of~~
removing does not include physical roughening, and the building up the conductive layer
includes ~~building up the conductive layer~~ filling the cavities sufficiently that separation ~~requires~~
~~destroying~~ would destroy integrity of at least one of the conductive layer and the dielectric
material.

12. (Withdrawn-currently amended) A process of making an electrical device,
the process including ~~the step of~~:

building up a conductive layer of material on a layer of dielectric material, the
layers joined in a saw-tooth manner made of both materials in an interlocking bite to form a
portion of circuitry of the electrical device, the conductive layer comprised of teeth, and wherein
a sample of the circuitry has at least 5,000 of the teeth per linear inch.

13. (Withdrawn-currently amended) The process of claim 12, wherein the ~~step~~
~~of building up the conductive layer includes forming teeth~~ electrical device comprises a micro
via.

14. (Withdrawn-currently amended) The process of claim 12, wherein, prior to the ~~step of~~ building up, the layer of the dielectric material has a surface gloss measurement at an angle of 60 degrees of less than 10%.

15. (Withdrawn-currently amended) The process of claim 12, wherein the ~~step of removing does not include physical roughening, and the~~ building up the conductive layer includes building up the conductive layer to produce a dielectric surface contact area greater than a dielectric surface contact area that would be produced by a single pass roughening.

16. (Withdrawn-currently amended) The process of claim 12, wherein the ~~step of producing the interlocking bite does not include physical roughening, and the~~ building up the conductive layer includes building up the conductive layer to produce a peel strength greater than a peel strength that would be produced by a single desmear process.

17. (Withdrawn-currently amended) The process of claim 12, wherein the ~~step of building up the conductive layer includes building up the conductive layer sufficiently that separation requires destroying~~ would destroy integrity of at least one of the conductive layer and the dielectric material.

18. (Withdrawn-currently amended) A process of making an electrical device, the process including ~~the step of~~:

building up a conductive layer to fill undercuttings in with respect to a surface of a dielectric material, a plurality of the undercuttings being obtuse to the surface and at least 1.5 tenths of a mil deep, ~~and~~ form a portion of circuitry of the electrical device.

19. (Withdrawn-currently amended) The process of claim 18, wherein the ~~step~~ of building up the conductive layer to fill the undercuttings includes forming teeth.

20. (Withdrawn-currently amended) A process of making an electrical device, the process including ~~the steps of~~:

producing a dielectric material with cavities remaining after removing an other portion of the dielectric material sufficient to produce a surface gloss measurement at an angle of 60 degrees of less than 10%; and

building up a conductive layer to fill the cavities and form electrical device circuitry.

21. (Withdrawn-currently amended) The process of claim 20, wherein a plurality of the cavities is obtusely angled and the ~~step of~~ building up the conductive layer includes forming teeth.

22. (Withdrawn-currently amended) The process of claim 20, wherein the ~~step~~ of removing does not include physical roughening, and the building up the conductive layer includes building up the conductive layer to produce a dielectric surface contact area greater than a dielectric surface contact area that would be produced by a single pass roughening.

23. (Withdrawn-currently amended) The process of claim 20, wherein the ~~step~~ of removing does not include physical roughening, and the building up the conductive layer ~~includes building up the conductive layer~~ fills the cavities sufficiently to produce a peel strength greater than a peel strength that would be produced by a single desmear process.

24. (Withdrawn-currently amended) The process of claim 20, wherein the ~~step of removing does not include physical roughening, and the~~ building up the conductive layer includes building up the conductive layer sufficiently that separation ~~requires destroying~~ would destroy integrity of at least one of the conductive layer and the dielectric material.

25. (Withdrawn-currently amended) A process for making an electrical device, the process including ~~the step of:~~

forming electrical device circuitry by building up a conductive layer on a dielectric material at a dielectric surface area greater than a dielectric surface area that would be produced by a single pass roughening, wherein a sample of the circuitry has at least 20% of the teeth that are within the range of 1 tenth of a mil deep to 2 tenths of a mil deep.

26. (Withdrawn-currently amended) The process of claim 25, wherein the ~~step of building up the~~ electrical device comprises a micro via ~~conductive layer includes forming teeth.~~

27. (Withdrawn-currently amended) The process of claim 25, wherein the ~~step of building up the~~ conductive layer includes building up the conductive layer in cavities formed without physical roughening and sufficiently to produce a peel strength greater than a peel strength that would be produced by a single desmear process.

28. (Withdrawn-currently amended) The process of claim 25, wherein the ~~step of building the~~ conductive layer is built up ~~includes building up the~~ conductive layer sufficiently that separation ~~requires destroying~~ would destroy integrity of at least one of the conductive

layer and the dielectric material.

29. (Withdrawn-currently amended) A process of making an electrical device, the process including ~~the step of~~:

combining a dielectric material with a conductive layer to form a portion of circuitry of the electrical device, said combining being carried out with means for joining the conductive layer to the dielectric material, the means including teeth built up on the dielectric material and angled sufficiently for mechanically gripping the dielectric material in three dimensions.

30. (Withdrawn-currently amended) A process ~~for~~ of making an electrical device, the process including ~~the step of~~:

combining a dielectric material with means for joining a conductive layer built up on the dielectric material to produce a peel strength greater than a peel strength that would be produced by a single desmear process, the conductive layer forming a portion of circuitry.

31. (Withdrawn-currently amended) The process of claim 30, wherein the ~~step of~~ combining is carried out with the means for joining comprised of teeth, a plurality of the teeth being obtuse to a top surface of the dielectric material and at least 1 tenth of a mil deep.

32. (Withdrawn-currently amended) A process of making an electrical device, the process including ~~the step of~~:

forming electrical device circuitry by building up a conductive layer on a surface of dielectric material to produce a peel strength greater than a peel strength that would be produced by a single desmear process, wherein a sample of the circuitry includes at least 20%

of the teeth that are within the range of 1 tenth of a mil deep to 2 tenths of a mil deep.

33. (Withdrawn-currently amended) The process of claim 32, wherein the ~~step of building up the conductive layer includes forming teeth~~ electrical device comprises a circuit board.

34. (Withdrawn-currently amended) The process of claim 32, wherein the ~~step of building up the conductive layer includes building up the conductive layer sufficiently that separation requires destroying~~ would destroy integrity of at least one of the conductive layer and the dielectric material.

35. (Withdrawn-currently amended) A process ~~for~~ of making an electrical device, the process including ~~the steps of:~~

producing a dielectric material comprising a top surface remaining from removing a portion of the dielectric material; and

applying means for mechanically gripping a conductive layer to the surface of the dielectric material so that a conductive layer is ~~borrowed~~ burrowed in and under the top surface of the dielectric material, wherein the conductive layer forms a portion of circuitry of the electrical device.

36. (Withdrawn-currently amended) The process of claim 35, wherein the ~~step of applying~~ is carried out with the means for mechanically gripping comprising teeth.

37. (Withdrawn-currently amended) A process of making an electrical device, the process including ~~the step of:~~

forming electrical device circuitry by building up a conductive layer on a dielectric material sufficiently that separation ~~requires destroying~~ would destroy integrity of the conductive layer and of the dielectric material.

38. (Withdrawn-currently amended) The process of claim 37, wherein ~~the step~~ of building up the conductive layer includes forming teeth.

39. (Withdrawn-currently amended) A process ~~for~~ of making an electrical device, the process including ~~the step of~~:

building up a conductive layer on a dielectric material ~~having~~ with a surface gloss measurement at an angle of 60 degrees of less than 10% to form circuitry of the electrical device.

40. (Withdrawn-currently amended) The process of claim 39, wherein the ~~step~~ of building up the conductive layer includes producing teeth.

41. (Withdrawn-currently amended) The process of claim 39, wherein ~~the step~~ of building up the conductive layer includes building up the conductive layer sufficiently that separation ~~requires destroying~~ would destroy integrity of the conductive layer.

42. (Withdrawn-currently amended) The process of claim 39, wherein the ~~step~~ of building up the conductive layer includes building up the conductive layer sufficiently that separation ~~requires destroying~~ would destroy integrity of the dielectric material.

43. (Withdrawn-currently amended) The process of claim 39, wherein the ~~step~~

of building up the conductive layer includes building up the conductive layer sufficiently that separation ~~requires destroying~~ would destroy integrity of the conductive material and the dielectric material.

44. (Withdrawn-currently amended) A process of making an electrical device, the process including ~~the step of~~:

combining a dielectric material with means for joining a conductive layer built up on the dielectric material at a dielectric surface contact area greater than a dielectric surface contact area that would be produced by a single pass roughening, the conductive layer forming a portion of circuitry.

45. (Withdrawn-currently amended) The process of claim 44, wherein the ~~step~~ of combining is carried out with the means for joining comprised of teeth.

46. (Withdrawn-currently amended) A process ~~for~~ of making an electrical device, the process including ~~the step of~~:

combining a dielectric material with means for joining a conductive layer built up on the dielectric material sufficiently that separation requires destroying integrity of at least one of the conductive layer and the dielectric material, said means for joining comprising filled cavities that form a portion of circuitry of the electrical device.

47. (Withdrawn-currently amended) The process of claim 44, wherein the ~~step~~ of combining is carried out with the filled cavities comprising teeth.

48. (Withdrawn-currently amended) The process of any one of claims 1, 3, 7, 11

43, 19, 21, 25 26, 29, 31, 32 33, 36, 38, 45, or 47 wherein:

a sample of the circuitry ~~has~~ includes at least 5,000 said teeth per linear inch.

49. (Withdrawn-currently amended) The process of any one of claims 1 3, 7, 12 43, 19, 21, 25 26, 29, 31, 32 33, 36, 38, 45, or 47 wherein:

a sample of the circuitry ~~has~~ includes at least 10,000 said teeth per linear inch.

50. (Withdrawn-currently amended) The process of any one of claims 1 3, 7, 12 43, 19, 21, 25 26, 29, 31, 32 33, 36, 38, 45, or 47 wherein:

a sample of the circuitry ~~has~~ includes at least 15,000 said teeth per linear inch.

51. (Withdrawn-currently amended) The process of any one of claims 1 3, 7, 12 43, 19, 21, 25 26, 29, 31, 32 33, 36, 38, 45, or 47 wherein:

a sample of the circuitry ~~has~~ includes at least 25,000 said teeth per square inch.

52. (Withdrawn-currently amended) The process of any one of claims 1 3, 7, 12 43, 19, 21, 25 26, 29, 31, 32 33, 36, 38, 45, or 47 wherein:

a sample of the circuitry ~~has~~ includes at least 100,000 said teeth per square inch.

53. (Withdrawn-currently amended) The process of any one of claims 1 3, 7, 12 43, 19, 21, 25 26, 29, 31, 32 33, 36, 38, 45, or 47 wherein:

a sample of the circuitry ~~has~~ includes at least 200,000 said teeth per square inch.

54. (Withdrawn-currently amended) The process of any one of claims 1 ~~3~~, ~~7~~, 12 ~~13~~, 19, 21, 25 ~~26~~, 29, 31, 32 ~~33~~, 36, 38, 45, or 47 wherein:

a sample of the circuitry ~~has~~ includes at least 20% of the teeth ~~have a shape~~ are shaped to that mechanically grip grips the dielectric material.

55. (Withdrawn-currently amended) The process of any one of claims 1 ~~3~~, ~~7~~, 12 ~~13~~, 19, 21, 25 ~~26~~, 29, 31, 32 ~~33~~, 36, 38, 45, or 47 wherein:

a sample of the circuitry ~~has~~ includes at least 50% of the teeth that are obtuse shaped.

56. (Withdrawn-currently amended) The process of any one of claims 1 ~~3~~, ~~7~~, ~~13~~ 12, 17, 19, 21, 25 ~~26~~, 29, 31, 32 ~~33~~, 36, 38, 45, or 47 wherein:

a sample of the circuitry ~~has~~ includes at least 20% of the teeth that are within the range of at least 1 tenth of a mil deep.

57. (Withdrawn-currently amended) The process of any one of claims 1 ~~3~~, ~~7~~, 12 ~~13~~, 19, 21, 25 ~~26~~, 29, 31, 32 ~~33~~, 36, 38, 45, or 47 wherein:

a sample of the circuitry ~~has~~ includes at least 50% of the teeth that are within the range of at least 1 tenth of a mil deep.

58. (Withdrawn-currently amended) The process of any one of claims 1, 3, ~~7~~, 12, 17 ~~13~~, 19, 21, ~~26~~, 29, 31, ~~33~~, 36, 38, 45, or 47 wherein:

a sample of the circuitry ~~has~~ includes at least 20% of the teeth that are within the range of 1 tenth of a mil deep to 2 tenths of a mil deep.

59. (Withdrawn-currently amended) The process of any one of claims 1, 2, 3, 7, 12, 17 43, 19, 21, ~~26~~, ~~29~~, 31, ~~33~~, 36, 38, 45, or 47 wherein:

a sample of the circuitry ~~has~~ includes at least 50% of the teeth that are within the range of 1 tenth of a mil deep to 2 tenths of a mil deep.

60. (Withdrawn-currently amended) The process of any one of claims 1, ~~3~~, 7, 12 43, 19, 21, 25 ~~26~~, 29, 31, 32 ~~33~~, 36, 38, 45, or 47 wherein:

a sample of the circuitry ~~has~~ includes at least 20% of the teeth that are in the range of 1.5 tenths of a mil deep to 1.75 tenths of a mil deep.

61. (Withdrawn-currently amended) The process of any one of claims 1 ~~3~~, 7, 12 43, 19, 21, 25 ~~26~~, 29, 31, 32 ~~33~~, 36, 38, 45, or 47 wherein:

a sample of the circuitry ~~has~~ includes at least 50% of the teeth that are in the range of 1.5 tenths of a mil deep to 1.75 tenths of a mil deep.

62. (Withdrawn-currently amended) The process of claim 48, further including ~~the step of~~ configuring the circuitry of the electrical device as multi-layer circuitry, one of said ~~multi-layers having~~ comprising said teeth and another of said layers ~~having~~ comprising corresponding teeth.

63. (Withdrawn-currently amended) The process of claim 49, further including ~~the step of~~ configuring the circuitry of the electrical device as multi-layer circuitry, one of said ~~multi-layers having~~ comprising said teeth and another of said layers ~~having~~ comprising corresponding teeth.

64. (Withdrawn-currently amended) The process of claim 50, further including ~~the step of~~ configuring the circuitry of the electrical device as multi-layer circuitry, one of said ~~multi-layers having~~ comprising said teeth and another of said layers ~~having~~ comprising corresponding teeth.

65. (Withdrawn-currently amended) The process of claim 51, further including ~~the step of~~ configuring the circuitry of the electrical device as multi-layer circuitry, one of said ~~multi-layers having~~ comprising said teeth and another of said layers ~~having~~ comprising corresponding teeth.

66. (Withdrawn-currently amended) The process of claim 52, further including ~~the step of~~ configuring the circuitry of the electrical device as multi-layer circuitry, one of said ~~multi-layers having~~ comprising said teeth and another of said layers ~~having~~ comprising corresponding teeth.

67. (Withdrawn-currently amended) The process of claim 53, further including ~~the step of~~ configuring the circuitry of the electrical device as multi-layer circuitry, one of said ~~multi-layers having~~ comprising said teeth and another of said layers ~~having~~ comprising corresponding teeth.

68. (Withdrawn-currently amended) The process of claim 54, further including ~~the step of~~ configuring the circuitry of the electrical device as multi-layer circuitry, one of said ~~multi-layers having~~ comprising said teeth and another of said layers ~~having~~ comprising corresponding teeth.

69. (Withdrawn-currently amended) The process of claim 55, further including ~~the step of~~ configuring the circuitry of the electrical device as multi-layer circuitry, one of said ~~multi-layers having~~ comprising said teeth and another of said layers ~~having~~ comprising corresponding teeth.

70. (Withdrawn-currently amended) The process of claim 56, further including ~~the step of~~ configuring the circuitry of the electrical device as multi-layer circuitry, one of said ~~multi-layers having~~ comprising said teeth and another of said layers ~~having~~ comprising corresponding teeth.

71. (Withdrawn-currently amended) The process of claim 57, further including ~~the step of~~ configuring the circuitry of the electrical device as multi-layer circuitry, one of said ~~multi-layers having~~ comprising said teeth and another of said layers ~~having~~ comprising corresponding teeth.

72. (Withdrawn-currently amended) The process of claim 58, further including ~~the step of~~ configuring the circuitry of the electrical device as multi-layer circuitry, one of said ~~multi-layers having~~ comprising said teeth and another of said layers ~~having~~ comprising corresponding teeth.

73. (Withdrawn-currently amended) The process claim 59, further including ~~the step of~~ configuring the circuitry of the electrical device as multi-layer circuitry, one of said ~~multi-layers having~~ comprising said teeth and another of said layers ~~having~~ comprising corresponding teeth.

74. (Withdrawn-currently amended) The process of claim 60, further including ~~the step of~~ configuring the circuitry of the electrical device as multi-layer circuitry, one of said multi-layers ~~having~~ comprising said teeth and another of said layers ~~having~~ comprising corresponding teeth.

75. (Withdrawn-currently amended) The process of claim 61, further including ~~the step of~~ configuring the circuitry of the electrical device as multi-layer circuitry, one of said multi-layers ~~having~~ comprising said teeth and another of said layers ~~having~~ comprising corresponding teeth.

76. (Withdrawn-currently amended) The process of claim 48, further including ~~the step of~~ configuring the circuitry as of double sided circuitry, one side ~~having~~ comprising said teeth and another side ~~having~~ comprising corresponding teeth.

77. (Withdrawn-currently amended) The process of claim 49, further including ~~the step of~~ configuring the circuitry as double sided circuitry, one side ~~having~~ comprising said teeth and another side ~~having~~ comprising corresponding teeth.

78. (Withdrawn-currently amended) The process of claim 50, further including ~~the step of~~ configuring the circuitry as double sided circuitry, one side ~~having~~ comprising said teeth and another side ~~having~~ comprising corresponding teeth.

79. (Withdrawn-currently amended) The process of claim 51, further including ~~the step of~~ configuring the circuitry as of double sided circuitry, one side ~~having~~ comprising said teeth and another side ~~having~~ comprising corresponding teeth.

80. (Withdrawn-currently amended) The process of claim 52, further including ~~the step of~~ configuring the circuitry as of double sided circuitry, one side ~~having~~ comprising said teeth and another side ~~having~~ comprising corresponding teeth.

81. (Withdrawn-currently amended) The process of claim 53, further including ~~the step of~~ configuring the circuitry as of double sided circuitry, one side ~~having~~ comprising said teeth and another side ~~having~~ comprising corresponding teeth.

82. (Withdrawn-currently amended) The process of claim 54, further including ~~the step of~~ configuring the circuitry as of double sided circuitry, one side ~~having~~ comprising said teeth and another side ~~having~~ comprising corresponding teeth.

83. (Withdrawn-currently amended) The process of claim 55, further including ~~the step of~~ configuring the circuitry as double sided circuitry, one side ~~having~~ comprising said teeth and another side ~~having~~ comprising corresponding teeth.

84. (Withdrawn-currently amended) The process of claim 56, further including ~~the step of~~ configuring the circuitry as double sided circuitry, one side ~~having~~ comprising said teeth and another side ~~having~~ comprising corresponding teeth.

85. (Withdrawn-currently amended) The process of claim 57, further including ~~the step of~~ configuring the circuitry as double sided circuitry, one side ~~having~~ comprising said teeth and another side ~~having~~ comprising corresponding teeth.

86. (Withdrawn-currently amended) The process of claim 58, further including ~~the step of~~ configuring the circuitry as double sided circuitry, one side ~~having~~ comprising said teeth and another side ~~having~~ comprising corresponding teeth.

87. (Withdrawn-currently amended) The process of claim 59, further including ~~the step of~~ configuring the circuitry as double sided circuitry, one side ~~having~~ comprising said teeth and another side ~~having~~ comprising corresponding teeth.

88. (Withdrawn-currently amended) The process of claim 60, further including ~~the step of~~ configuring the circuitry as double sided circuitry, one side ~~having~~ comprising said teeth and another side ~~having~~ comprising corresponding teeth.

89. (Withdrawn-currently amended) The process of claim 61, further including ~~the step of~~ configuring the circuitry as double sided circuitry, one side ~~having~~ comprising said teeth and another side ~~having~~ comprising corresponding teeth.

90. (Withdrawn-currently amended) A product produced by the process of any one of claims 1, 7, 12, 18, 20, 25, 29, 30, 35, 32, 37, 44, or 46.

91. (Currently amended) An electrical device including:
 a dielectric material having a top surface with cavities remaining from removal of a portion of the dielectric material;
 a conductive layer built up on the dielectric material to fill the cavities ~~so as to~~
form teeth set in and under the top surface of the dielectric material; and wherein:
 the conductive layer is a portion of circuitry of the electrical device, and a plurality

of the cavities are obtuse with respect to the top surface and are at least 1 tenth of a mil deep.

92. (Previously presented) The device of claim 91, wherein the removal of the portion is sufficient to produce a surface gloss measurement at an angle of 60 degrees of less than 10%.

93. (Previously presented) The device of claim 91, wherein the conductive layer built up to fill the cavities is comprised of teeth.

94. (Currently amended) The device of claim 91, wherein the removal does not include physical roughening, and the conductive layer has a dielectric surface contact area greater than a dielectric surface contact area that would be produced by a single pass roughening.

95. (Currently amended) The device of claim 91, wherein the removal does not include physical roughening, and the conductive layer ~~is built up to fill~~ in the cavities sufficiently ~~for~~ to produce a peel strength greater than a peel strength that would be produced by a single desmear process.

96. (Currently amended) The device of claim 91, wherein the conductive layer ~~is built up to fill~~ in the cavities sufficiently that separation requires destroying integrity of at least one of the conductive layer and the portion of the dielectric material.

97. (Currently amended) An electrical device including:
a dielectric material having cavities remaining from removal of a portion of the

dielectric material;

a conductive layer built up on the dielectric material to fill the cavities to form a surface of substantially angular teeth set in the dielectric material; and wherein:

the conductive layer is a portion of circuitry of the electrical device, and a sample of the circuitry has at least 20% of the teeth being at least 1 tenth of a mil deep.

98. (Previously presented) The device of claim 97, wherein the removal of the portion is sufficient to produce a surface gloss measurement at an angle of 60 degrees or less than 10%.

99. (Currently amended) The device of claim 97, wherein the removal does not include physical roughening, and the conductive layer has a dielectric surface contact area greater than a dielectric surface contact area that would be produced by a single pass roughening.

100. (Currently amended) The device of claim 97, wherein the removal does not include physical roughening, and the conductive layer ~~is built up to fill~~ in the cavities sufficiently to produce a peel strength greater than a peel strength that would be produced by a single desmear process.

101. (Currently amended) The device of claim 97, wherein the conductive layer built up is built up sufficiently that separation ~~requires destroying~~ would destroy integrity of at least one of the conductive layer and the dielectric material.

102. (Currently amended) An electrical device including:

a conductive layer of material built up on a layer of a dielectric material, the layers joined in a saw-tooth manner made of both materials in an interlocking bite; wherein the conductive layer is a portion of circuitry of the electrical device, the conductive layer is comprised of teeth, and a sample of the circuitry has at least 5,000 of the teeth per linear inch.

103. (Currently amended) The device of claim 102, wherein the electrical device comprises a micro via ~~conductive layer built up to fill the cavities is comprised of teeth.~~

104. (Previously presented) The device of claim 102, wherein the dielectric material has a surface gloss measurement at an angle of 60 degrees of less than 10% prior to the conductive layer of material being built up thereon.

105. (Currently amended) The device of claim 102, wherein the conductive layer has a dielectric surface contact area that, without physical roughening, is greater than a dielectric surface contact area that would be produced by a single pass roughening.

106. (Currently amended) The device of claim 102, wherein the interlocking bite is formed without physical roughening, and the conductive layer built up is built up sufficiently to produce a peel strength greater than a peel strength that would be produced by a single desmear process.

107. (Currently amended) The device of claim 102, wherein the conductive layer built up is built up sufficiently that separation ~~requires destroying~~ would destroy integrity of at least one of the conductive layer and the dielectric material.

108. (Currently amended) An electrical device including:

a conductive layer ~~having~~ including a surface built up to fill undercuttings in a dielectric material, a plurality of the undercuttings being obtuse to the surface and at least 1.5 tenths of a mil deep, wherein

the conductive layer is a portion of circuitry of the electrical device.

109. (Previously presented) The device of claim 108, wherein the conductive layer built up to fill the undercuttings is comprised of teeth.

110. (Previously presented) An electrical device including:

a dielectric material with cavities remaining after removal of a portion of the dielectric material sufficient to produce a surface gloss measurement at an angle of 60 degrees of less than 10%; and

electrical device circuitry comprised of a conductive layer built up to fill the cavities.

111. (Currently amended) The device of claim 110, wherein a plurality of the cavities are obtusely angled, and the conductive layer built up to fill the cavities is comprised of teeth.

112. (Currently amended) The device of claim 110, wherein the conductive layer has a dielectric surface contact area that, without physical roughening, is greater than a dielectric surface contact area that would be produced by a single pass roughening.

113. (Currently amended) The device of claim 110, wherein the removal does not include physical roughening, and the conductive layer is built up to fill in the cavities sufficiently to produce a peel strength greater than a peel strength that would be produced by a single desmear process.

114. (Currently amended) The device of claim 110, wherein the conductive layer is ~~built up~~ sufficiently built up that separation ~~requires destroying~~ destroys integrity of at least one of the conductive layer and the dielectric material.

115. (Currently amended) An electrical device including:
 a dielectric material; and
 electrical device circuitry comprising a conductive layer built up on the dielectric material at a dielectric surface area greater than a dielectric surface area that would be produced by a single pass roughening; and wherein
a sample of the circuitry has at least 20% of the teeth that are within the range of 1 tenth of a mil deep to 2 tenths of a mil deep.

116. (Currently amended) The device of claim 115, wherein the electrical device comprises a micro via ~~conductive layer built up to fill the cavities is comprised of teeth.~~

117. (Currently amended) The device of claim 115, wherein the conductive layer built up is built up in cavities formed without physical roughening and sufficiently to produce a peel strength greater than a peel strength that would be produced by a single desmear process.

118. (Currently amended) The device of claim 115, wherein the conductive layer built up is built up sufficiently that separation requires destroying integrity of at least one of the conductive layer and the dielectric material.

119. (Previously presented) An electrical device including:
a dielectric material;
a conductive layer forming a portion of circuitry of the electrical device; and
means for joining the conductive layer to the dielectric material, the means including teeth built up on the dielectric material and angled sufficiently for mechanically gripping the dielectric material in three dimensions.

120. (Currently amended) An electrical device including:
a dielectric material; and
means for joining a conductive layer built up on the dielectric material to produce a peel strength greater than a peel strength that would be produced by a single desmear process, wherein the conductive layer is a portion of circuitry, and portions of the conductive layer are obtuse to a top surface of the dielectric material and at least 1 tenth of a mil deep.

121. (Previously presented) The device of claim 120, wherein the means for joining is comprised of teeth.

122. (Currently amended) An electrical device including:
a dielectric material; and
electrical device circuitry comprising a conductive layer built up on a surface of the dielectric material to produce a peel strength greater than a peel strength that would be

produced by a single desmear process; and wherein

a sample of the circuitry has at least 20% of the teeth that are within the range of 1 tenth of a mil deep to 2 tenths of a mil deep.

123. (Currently Amended) The device of claim 122, wherein the electrical device comprises a circuit board ~~conductive layer built up on the surface is comprised of teeth.~~

124. (Currently amended) The device of claim 122, wherein the conductive layer built up is built up sufficiently that separation ~~requires destroying~~ would destroy integrity of at least one of the conductive layer and the dielectric material.

125. (Currently amended) An electrical device including:
a dielectric material having a top surface with a surface remaining from removal of a portion of the dielectric material; and

means for mechanically gripping a conductive layer to the surface of the dielectric material so that the conductive layer is ~~borrowed~~ burrowed in and under the top surface of the dielectric material, wherein the conductive layer forms a portion of circuitry of the electrical device.

126. (Previously presented) The device of claim 125, wherein the means for mechanically gripping is comprised of teeth.

127. (Currently amended) An electrical device including:

a dielectric material; and

electrical device circuitry comprising a conductive layer built up on the dielectric

material sufficiently that separation would requires destroying integrity of the conductive layer and of the dielectric material.

128. (Previously presented) The device of claim 127, wherein the conductive layer is comprised of teeth.

129. (Previously presented) An electrical device including:
a dielectric material having a surface gloss measurement at an angle of 60 degrees of less than 10%; and
circuitry of the electrical device comprised of a conductive layer on the dielectric material.

130. (Previously presented) The device of claim 129, wherein the conductive layer is comprised of teeth.

131. (Currently amended) The device of claim 129, wherein the conductive layer is built up on the dielectric material is built up sufficiently that separation ~~requires~~ ~~destroying~~ would destroy integrity of the conductive layer.

132. (Currently amended) The device of claim 129, wherein the conductive layer is built up on the dielectric material is built up sufficiently that separation ~~requires~~ ~~destroying~~ would destroy integrity of the dielectric material.

133. (Currently amended) The device of claim 129, wherein the conductive layer is built up on the dielectric material is built up sufficiently that separation ~~requires~~

destroying would destroy integrity of the conductive material layer and the dielectric material.

134. (Previously presented) An electrical device including:

a dielectric material; and

means for joining a conductive layer built up on the dielectric material at a dielectric surface contact area greater than a dielectric surface contact area that would be produced by a single pass roughening, wherein the conductive layer is a portion of circuitry of the electrical device.

135. (Previously presented) The device of claim 134, wherein the means for joining is comprised of teeth.

136. (Previously presented) An electrical device including:

a dielectric material; and

means for joining a conductive layer built up on the dielectric material sufficiently that separation requires destroying integrity of at least one of the conductive layer and the dielectric material, said means for joining comprising filled cavities that form a portion of circuitry of the electrical device.

137. (Previously presented) The device of claim 134, wherein the filled cavities comprises teeth.

138. (Currently amended) The device of any one of claims 93, 97, ~~403~~ 101, 109, 111, ~~446~~ 115, 119, 121, ~~423~~ 122, 126, 128, 135, or 137 wherein:

a sample of the circuitry has at least 5,000 said teeth per linear inch.

139. (Currently amended) The device of any one of claims 93, 97, ~~403~~ 102, 109, 111, ~~446~~ 115, 119, 121, ~~423~~ 122, 126, 128, 135, or 137 wherein:
a sample of the circuitry has at least 10,000 said teeth per linear inch.

140. (Currently amended) The device of any one of claims 93, 97, ~~403~~ 102, 109, 111, ~~446~~ 115, 119, 121, ~~423~~ 122, 126, 128, 135, or 137 wherein:
a sample of the circuitry has at least 15,000 said teeth per linear inch.

141. (Currently amended) The device of any one of claims 93, 97, ~~403~~ 102, 109, 111, ~~446~~ 115, 119, 121, ~~423~~ 122, 126, 128, 135, or 137 wherein:
a sample of the circuitry has at least 25,000 said teeth per square inch.

142. (Currently amended) The device of any one of claims 93, 97, ~~403~~ 102, 109, 111, ~~446~~ 115, 119, 121, ~~423~~ 122, 126, 128, 135, or 137 wherein:
a sample of the circuitry has at least 100,000 said teeth per square inch.

143. (Currently amended) The device of any one of claims 93, 97, ~~403~~ 102, 109, 111, ~~446~~ 115, 119, 121, ~~423~~ 122, 126, 128, 135, or 137 wherein:
a sample of the circuitry has at least 200,000 said teeth per square inch.

144. (Currently amended) The device of any one of claims 93, 97, ~~403~~ 102, 109, 111, ~~446~~ 115, 119, 121, ~~423~~ 122, 126, 128, 135, or 137 wherein:
a sample of the circuitry has at least 20% of the teeth have a shape that mechanically grips the dielectric material.

145. (Currently Amended) The device of any one of claims 93, 97, ~~403~~ 102, 109, 111, ~~446~~ 115, 119, 121, ~~423~~ 122, 126, 128, 135, or 137 wherein:

a sample of the circuitry has at least 50% of the teeth ~~that are~~ structured obtusely shaped with respect to a line within a plane defined by a surface of the dielectric material that was removed.

146. (Currently amended) The device of any one of claims 93, 97, 102, ~~403~~ 107, 109, 111, ~~446~~ 115, 119, 121, ~~423~~ 122, 126, 128, 135, or 137 wherein:

a sample of the circuitry has at least 20% of the teeth that are within the range of at least 1 tenth of a mil deep.

147. (Currently Amended) The device of any one of claims 93, 97, ~~403~~ 102, 109, 111, ~~446~~ 115, 119, 121, ~~423~~ 122, 126, 128, 135, or 137 wherein:

a sample of the circuitry has at least 50% of the teeth that are within the range of at least 1 tenth of a mil deep.

148. (Currently amended) The device of any one of claims 93, 97, 98, ~~403~~ 102, 109, 111, ~~446~~ 115, 119, 121, ~~423~~, 126, 128, 135, or 137 wherein:

a sample of the circuitry has at least 20% of the teeth that are within the range of 1 tenth of a mil deep to 2 tenths of a mil deep.

149. (Currently amended) The device of any one of claims 93, 97, 98, ~~403~~ 102, 107, 109, 111, ~~446~~, 119, ~~424~~, 123, 126, 128, 135, or 137 wherein:

a sample of the circuitry has at least 50% of the teeth that are within the range of

1 tenth of a mil deep to 2 tenths of a mil deep.

150. (Currently Amended) The device of any one of claims 93, 97, ~~403~~ 102, 109, 111, ~~446~~ 115, 119, 121, ~~423~~ 122, 126, 128, 135, or 137 wherein:

a sample of the circuitry has at least 20% of the teeth that are in the range of 1.5 tenths of a mil deep to 1.75 tenths of a mil deep.

151. (Currently Amended) The device of any one of claims 93, 97, ~~403~~ 102, 109, 111, ~~446~~ 115, 119, 121, ~~423~~ 122, 126, 128, 135, or 137 wherein:

a sample of the circuitry has at least 50% of the teeth that are in the range of 1.5 tenths of a mil deep to 1.75 tenths of a mil deep.

154. (Currently Amended) The device of claim 140, wherein the circuitry of the electrical device is comprised of multi-layer circuitry, one of said ~~multi-layers~~ having comprising said teeth and another of said layers ~~having~~ comprising corresponding teeth.

155. (Currently Amended) The device of claim 141, wherein the circuitry of the electrical device is comprised of multi-layer circuitry, one of said ~~multi-layers~~ having comprising said teeth and another of said layers ~~having~~ comprising corresponding teeth.

156. (Currently Amended) The device of claim 142, wherein the circuitry of the electrical device is comprised of multi-layer circuitry, one of said ~~multi-layers~~ having comprising said teeth and another of said layers ~~having~~ comprising corresponding teeth.

157. (Currently Amended) The device of claim 143, wherein the circuitry of the

electrical device is comprised of multi-layer circuitry, one of said ~~multi-layers~~ having comprising said teeth and another of said layers ~~having~~ comprising corresponding teeth.

158. (Currently Amended) The device of claim 144, wherein the circuitry of the electrical device is comprised of multi-layer circuitry, one of said ~~multi-layers~~ having comprising said teeth and another of said layers ~~having~~ comprising corresponding teeth.

159. (Currently Amended) The device of claim 145, wherein the circuitry of the electrical device is comprised of multi-layer circuitry, one of said ~~multi-layers~~ having comprising said teeth and another of said layers ~~having~~ comprising corresponding teeth.

160. (Currently Amended) The device of claim 146, wherein the circuitry of the electrical device is comprised of multi-layer circuitry, one of said ~~multi-layers~~ having comprising said teeth and another of said layers ~~having~~ comprising corresponding teeth.

161. (Currently Amended) The device of claim 147, wherein the circuitry of the electrical device is comprised of multi-layer circuitry, one of said ~~multi-layers~~ having comprising said teeth and another of said layers ~~having~~ comprising corresponding teeth.

162. (Currently Amended) The device of claim 148, wherein the circuitry of the electrical device is comprised of multi-layer circuitry, one of said ~~multi-layers~~ having comprising said teeth and another of said layers ~~having~~ comprising corresponding teeth.

163. (Currently Amended) The device of claim 149, wherein the circuitry of the electrical device is comprised of multi-layer circuitry, one of said ~~multi-layers~~ having comprising

said teeth and another of said layers ~~having~~ comprising corresponding teeth.

164. (Currently mended) The device of claim 150, wherein the circuitry of the electrical device is comprised of multi-layer circuitry, one of said ~~multi-layers~~ ~~having~~ comprising said teeth and another of said layers ~~having~~ comprising corresponding teeth.

165. (Currently amended) The device of claim 151, wherein the circuitry of the electrical device is comprised of multi-layer circuitry, one of said ~~multi-layers~~ ~~having~~ comprising said teeth and another of said layers ~~having~~ comprising corresponding teeth.

166. (Currently amended) The device of claim 138, wherein the circuitry is comprised of double sided circuitry, one side ~~having~~ comprising said teeth and another side ~~having~~ comprising corresponding teeth.

167. (Currently amended) The device of claim 139, wherein the circuitry is comprised of double sided circuitry, one side ~~having~~ comprising said teeth and another side ~~having~~ comprising corresponding teeth.

168. (Currently amended) The device of claim 140, wherein the circuitry is comprised of double sided circuitry, one side ~~having~~ comprising said teeth and another side ~~having~~ comprising corresponding teeth.

169. (Currently amended) The device of claim 141, wherein the circuitry is comprised of double sided circuitry, one side ~~having~~ comprising said teeth and another side ~~having~~ comprising corresponding teeth.

170. (Currently amended) The device of claim 142, wherein the circuitry is comprised of double sided circuitry, one side ~~having~~ comprising said teeth and another side ~~having~~ comprising corresponding teeth.

171. (Currently amended) The device of claim 143, wherein the circuitry is comprised of double sided circuitry, one side ~~having~~ comprising said teeth and another side ~~having~~ comprising corresponding teeth.

172. (Currently amended) The device of claim 144, wherein the circuitry is comprised of double sided circuitry, one side ~~having~~ comprising said teeth and another side ~~having~~ comprising corresponding teeth.

173. (Currently amended) The device of claim 145, wherein the circuitry is comprised of double sided circuitry, one side ~~having~~ comprising said teeth and another side ~~having~~ comprising corresponding teeth.

174. (Currently amended) The device of claim 146, wherein the circuitry is comprised of double sided circuitry, one side ~~having~~ comprising said teeth and another side ~~having~~ comprising corresponding teeth.

175. (Currently amended) The device of claim 147, wherein the circuitry is comprised of double sided circuitry, one side ~~having~~ comprising said teeth and another side ~~having~~ comprising corresponding teeth.

176. (Currently amended) The device of claim 148, wherein the circuitry is comprised of double sided circuitry, one side ~~having~~ comprising said teeth and another side ~~having~~ comprising corresponding teeth.

177. (Currently amended) The device of claim 149, wherein the circuitry is comprised of double sided circuitry, one side ~~having~~ comprising said teeth and another side ~~having~~ comprising corresponding teeth.

178. (Currently amended) The device of claim 150, wherein the circuitry is comprised of double sided circuitry, one side ~~having~~ comprising said teeth and another side ~~having~~ comprising corresponding teeth.

179. (Currently amended) The device of claim 151, wherein the circuitry is comprised of double sided circuitry, one side ~~having~~ comprising said teeth and another side ~~having~~ comprising corresponding teeth.

180. (Withdrawn-currently amended) A process of making the electrical device product of any one of claims 91, 97, 102, 108, 110, 115, 119, 120, 122, 125, 129, 134, or 136, the method including ~~the step of~~:

forming means for joining by building up a conductive layer on a dielectric material surface remaining from removal of a portion of the dielectric material to form a portion of circuitry in the electrical device.